DECLARATION PURSUANT TO 37. C.F.R. 1.132

I, Sumihito SAGO hereby declare and that

1. I have been a member of Noritake Co., Limited. (Noritake), an owner of this application. I have a master degree in a field of applied chemistry, and have been serving in Noritake as chief in a research and development center. I engaged in Noritake Dental Supply Co., Limited in development of dental porcelain from 2003 to 2005 as a director in charge of development. In light of my experiences and current position in Noritake, I am very knowledgeable about ceramic and applied articles thereof, especially about development of materials such as glass material and crystal material, specifically material for a dental prosthesis.

2. I am one of the represented inventors, and am familiar to content of this application.

3. I will explain the present invention, especially the invention recited in the newest amended claim 1, and about differences between the present invention and the prior arts, for easy understanding thereof.

- Background Art

The dental prosthesis needs to be manufactured considering various requirements such as strength, beauty and the like.

For satisfying the requirement of beauty, providing a color tone and a light permeability (transparency) closer to those of a natural tooth on a surface of the dental prosthesis has been tried. Provision of the color tone and the light permeability is achieved by for example forming two ornament layers (armored portion) on a substrate (frame) made from ceramic or metal. These ornament layers, which are so-called "ceramic layers", are constituted of material containing porcelain containing glass. These two ornament layers are respectively fixed on a surface of a substrate by subjecting them to a heat treatment sequentially (refer to paragraph [0009] of this application).

- Subject of the Invention

When the two ornament layers are respectively subjected to the heat

treatment, the following problem was encountered. In detail, there was a case where, a lower layer having been previously formed on the surface of the substrate is softened during the heat treatment for forming an upper layer of the armored portion, and the lower layer is flowed as a result of flow of the porcelain forming the upper layer. If such a flow of the lower layer arises, thickness of the lower layer may be partially changed, and the frame may be exposed. Positions and thicknesses of the lower layer and the upper layer are designed to realize the color tone and the light permeability of the dental prosthesis manufactured. Accordingly, the partial thickness change of the lower layer may cause inconveniences that the desired color tone and transparency are not realized at a part of the dental prosthesis.

Such problem remarkably arises when the upper layer is formed by a casting method, because a porcelain for the upper layer heated to high temperature, which is pressedly poured into the casting mold, may move the lower layer on flowing on the lower layer.

An object of the invention according to this application is to provide a method of manufacturing a dental prosthesis in which on forming a plurality of coating layers on the substrate, even when an another layer is additionally formed on a surface of the lower layer by the casting method, the lower layer is not moved.

- Feature of the Invention

The inventors of this application, as will be detailed later, found that the relations between temperature and viscosity of porcelains are not uniform independent of the porcelain but changes, and degree of viscosity variation relative to temperature variation differs depending on kinds of the porcelains. The present invention, which was made based on such knowledge, can solve the above-mentioned problem, by selecting porcelains for the upper layer and the lower layer such that viscosity of the porcelain used for the upper layer lower than that used for the lower layer, at the casing temperature of the upper layer

That is, the present invention (invention recited in the amended claim 1) is as follow:

A method of manufacturing a dental prosthesis, comprising:

a step of preparing a substrate of the dental prosthesis that is constituted by a dental molding material;

a step of forming a back coating layer on at least a part of a surface of the substrate, by using a first porcelain that is constituted principally by ceramic;

a step of forming a casting mold such that the substrate and the back coating layer are disposed in the casting mold and such that a void is provided on a surface of the back coating layer and a porcelain introducing passage communicating the void with an outside is provided; and

a step of forming a cast coating layer on at least a part of a surface of the back coating layer, by pouring a second porcelain which is held by ceramic holding portion provided with the casing mold, and is softened by heating with the casting mold, into the void of the casting mold via the porcelain introducing passage under pressure using the casing mold heated to a casting temperature to form at least two coating layers including the back coating layer and the cast coating layer on the surface of the substrate,

wherein the second porcelain is constituted principally by ceramic whose composition is different from that of the ceramic of the first porcelain such that viscosity of the second porcelain at the casting temperature is lower than that of the first porcelain.

- Relation between temperature and viscosity of porcelain

Hereafter, relation between magnitude of the temperature and magnitude of the viscosity of the porcelain material (glass) will be explained with reference to attached materials I to III showing results of additional experiments executed by inventors of the present inventions.

Attached material I shows relations between a temperature and a viscosity of a fist test piece made of a Glass 1 (SBS) having a composition shown in a Table of an attached material III, and a second test piece made of an Ingot having a composition shown in the Table of the attached material III.

Specifically, the first test piece and the second test piece are manufactured through the following steps. First, glass powders as the materials are mixed, and the mixture is melted at the predetermined temperature for vitrification. Then, the vitrified material is cooled for solidification, and solidified material is processed into a size suitable for measurement. The viscosities of the first and second test pieces thus manufactured are measured during the heating up to 1200℃. If the first and second test pieces are cooled down to the room temperature after measurement completion of the viscosities, they are solidified again due to the nature of glass mentioned above.

In the graph of the attached material I, a horizontal axis shows the

temperature of Glass 1 (SBS) and Ingot, and a vertical axis shows the viscosity of Glass 1 (SBS) and the Ingot. In range from 850℃ to 1200℃ of the temperature, the viscosity of Glass 1 (SBS) is larger than that of the Ingot. Both viscosities of Glass 1 (SBS) and the Ingot decrease as increase of the temperature, and decreasing degree of the Ingot is slightly larger than that of the Glass 1 (SBS). When Glass 1 (SBS) and Ingot having such relation between highness-lowness of the temperature and smallness-largeness of the viscosity are used as the first porcelain and the second porcelain respectively, the opinion viscosity of the second porcelain is uniformly smaller than that of the first porcelain independent of the temperature can be concluded to be true.

Attached material II shows relations between a temperature and a viscosity of the fist test piece made of the Glass 1 (SBS) having a composition shown in the Table of attached material III, and a third test piece made of a Glass 2 having a composition shown in the Table of the attached material III.

The third test piece is manufactured in the same steps as the first and second test pieces. The viscosities of the first and third test pieces thus manufactured are measured during the heating up to 1200℃. If the first and third test pieces are cooled down to the room temperature after measurement completion of the viscosities, they are solidified again due to the nature of glass mentioned above.

In range from 850℃ to 1000℃ of the temperature, the viscosity of the Glass 2 is larger than that of the Glass 1 (SBS), but in range from 1000℃ to 1200℃ of the temperature, the viscosity of the Glass 1 (SBS) is larger than that of the Glass 2. Thus, a relation regarding magnitude of the viscosity is reversed between the temperature range from 850℃ to 1000℃ and the temperature range from 1000℃ to 1200℃. When Glass 1 (SBS) and Glass 2 having such relations between highness-lowness of the temperature and smallness-largeness of the viscosity are used as the first porcelain and the second porcelain respectively, viscosity of Glass 1 is larger than that of Glass 2 for some extent temperature (less than 1000℃ in this example) but is not larger than that of Glass 2 in other temperature range (more than 1000℃ in this example). By selecting the first porcelain and the second porcelain such that viscosity of the second porcelain is smaller than that of the first porcelain at the casting temperature, flowing of the back coating layer (lower layer) on forming the cast coating layer can be prevented. That is, the present invention can render the unexpected advantageous effect which prevents flowing of the first porcelain in such case.

- Casting method

Next, a so-called casting method for casting the porcelain into a casting mold, which is one element of the present invention, will be explained with reference to an attached material IV. This material IV is a Technical Instruction of "CZR PRESS" put into a market by the applicant of this application. The "CZR PRESS" is used as the porcelain for forming the upper layer of the two ornament layers, i.e., the casting layer, in the manufacturing method of the dental prosthesis of the present invention. Material IV describes a forming method of the dental prosthesis having the two decorated layers, of which upper layer is formed by the above casting method.

Specifically, description in material IV regarding "7. First Application and Baking of Shade Base Strain" (from page 6 to page 7) corresponds to "a step of forming a back coating layer on at least a part of a surface of the substrate, by using a first porcelain that is constituted principally by ceramic" of the present invention, and description in paragraph [0084] of the Specification. That is, the first porcelain is applied on a surface 12 of a frame 10 by a brush etc., and the applied first porcelain is baked to become the back coating layer 14. Meanwhile, a Table "The difference between CZR Shade Base Porcelain and CZR PRESS Shade Base Strain" on page 6 of the material IV describes a sample in which a layer containing CZR PRESS Shade Base Stain corresponding to the back coating layer as the porcelain is baked at temperature 1090℃.

Description regarding "11. Investing" (page 10), "12. Preparing before Burn-out" (page 10) and "13. Burn-out of Investment Ring" (page 11) correspond to "a step of forming a casting mold such that the substrate and the back coating layer are disposed in the casting mold and such that a void is provided on a surface of the back coating layer and a porcelain introducing passage communicating the void with an outside is provided" of the present invention and description in paragraph [0086] of the Specification. That is, on a surface 16 of the back coating layer 14 formed, a model layer 20 having a desired crown shape is formed with a dental wax etc. This model layer 20 is provided on a pedestal 26 together with a pin 22, and a casting ring 28 is provided to surround the pedestal 26. An investment material 30 is caused to flow into a void formed inside of the casting ring 28. Such process is shown in an upper pictures "After attaching the sprue" on page 9 and picture "Investing" on page 10 of material IV. Subsequently, after the investment material is hardened, the

model layer 20 is heated by the electric furnace etc. to e.g. 850℃, where the dental wax can be baked and removed. A void portion 18 is formed in the casting mold 32 at the position where the baked and removed model layer 20 had been previously provided. Such process is shown in a picture "Burn-out" on page 11 of material IV.

Description regarding "15. Inserting Ceramic Ingot and Plunger" (page 11) and "16. Pressing in the Press Furnace" (page 12), which corresponds to "a step of forming a cast coating layer on at least a part of a surface of the back coating layer, by pouring a second porcelain which is held by ceramic holding portion provided with the casing mold, and is softened by heating with the casting mold, into the void of the casting mold via the porcelain introducing passage under pressure using the casing mold heated to a casting temperature to form at least two coating layers including the back coating layer and the cast coating layer on the surface of the substrate" of the present invention and description in paragraphs [0087] and [0088] of the Specification, relates to the so-called casting method. That is, the void 18 of the casting mold 32 is filled with the second porcelain poured thereinto through an introducing passage formed by baking and removing the pin 22. The second porcelain is baked for example at 1050℃ for a predetermined time period and then cooled to become the cast coating layer 36. For detail of the baking temperature on forming the cast coating layer, a Table "Press Parameters for the EP500 (Ivoclar)" on page 24 which is referred in "16. Pressing in the Press Furnace" (page 12) can be referred. This Table describes an example in which the second porcelain is baked at 1045℃ with the casting mold 32 using the EP500 manufactured by Ivoclar Co. Ltd. which is the same hot press furnace as the present embodiment. This temperature is close to 1050℃ which is the baking temperature of the cast coating layer described in the embodiment of the Specification of this application.

In this way, the glass ingot which corresponds to the second porcelain is, together with a plunger (not shown) used for pressurizing the second porcelain, held by a ceramic holding portion (a portion where the pedestal had been previously provided) of the casing mold 32, in advance. Then, the glass ingot and the casting mold 32 are placed in the hot press furnace and heated. The ingot (second porcelain) softened by heating is pressurized by the plunger (not shown) toward the casing mold 32. The melted (softened) second porcelain is poured into the casting mold 32 through the porcelain introducing passage 24 (a portion where the pin 22 had been previously provided) and is supplied to the void 18. A process where the glass ingot which corresponds to the second porcelain is held by the ceramic holding portion of

the casting mold 32 is shown in a picture "Injection of the Ingot" at a lower part on page 11 of material IV. A process for mounting the plunger is shown in a picture "Insertion of Notitake Alumina Oxide Plunger" at a lower part on page 11 of material IV.

By the way, in the casting method, the first porcelain, which had been already formed as the back coating layer by baking, exists inside of the casting mold 32. The casing mold 32 is, on pouring in the second porcelain, heated by the hot press furnace to the baking temperature of the second porcelain e.g. 1045℃. Therefore, when the second porcelain is poured into the casing mold 32, the back coating layer 14, i.e., the first porcelain is in a condition where it is also heated to 1045℃ or closer thereto. The first porcelain, which mainly contains the glass, has the nature to be softened by the second or another heating, even after it is once baked and fixed to the substrate 10 as the back coating layer 14. For this reason, when the casting mold 32 is heated for pouring the second porcelain, if the first porcelain is softened to the extent to become flowable, there is a possibility that the first porcelain may be flowed or moved by the second porcelain which is poured into the casting mold 32 under pressure.

In view of this, the present invention intends to solve the above problem to make composition of the second porcelain different from that of the first porcelain such that viscosity of the second porcelain is smaller than that of the first porcelain at the casting temperature of the second porcelain. Here, it is shown and explained based on materials I to III that it is possible that viscosity of the second porcelain is smaller than that of the first porcelain at the casting temperature of the second porcelain because relations between temperature and viscosity are different depending on compositions of the porcelains, and the composition of the second porcelain is chosen to be different from that of the first porcelain.

- Advantageous effect of the present invention

According to the present invention thus featured, the manufacturing method of the dental prosthesis can be provided, in which on forming the plurality of coating layers on the substrate, when the second or another layer is additionally provided on the surface of the lower layer by the casting, the lower layer is not moved.

- Technical significance of the Cited references

Hereinafter, the relation between the present invention and the references

cited in the last Office Action will be explained.

Janjic (USP No. 3,934,348) does not describe (i) how the cast coating layer (Regular Porcelain Layer) is applied to the die, and (ii) the second porcelain is poured into the void provided in the casting mold under pressure via the porcelain introducing passage communicating the void with an outside. Thus, what is disclosed in Janjic is a static casting in which the second porcelain is poured into the casing mold under no pressure. Accordingly, the baking temperature of the regular porcelain is selected to be lower than that of the opaque porcelain considering the baking of the regular porcelain positioned on the opaque porcelain. If such relation of baking temperature is not considered, on baking of the regular porcelain, the opaque porcelain may be melted and mixed with the regular porcelain. Thus, Janjic differs from the present invention in the object. That is, the subject of the present invention is not encountered in Janjic.

Sozio (USP No. 4,585,417) discloses an opening 28 formed on a mold block 20, and an opening 44 formed on a block 40 in Fig. 4. However, there can be found no description that a cavity 26 or 50 is filled with shrink-free ceramic material under pressure. Accordingly, it appears that Sozio executes the static casting, and accordingly differs from the present invention in the concept of invention, likewise Janjic.

In Fukuda (Japanese Patent Publication 06-269466), a centrifugal coating by which the glass composition material is poured into the mold with centrifugal force is employed, as a method for obtaining a cast coating layer (Regular Porcelain Layer). In this centrifugal casting, the glass material heated (up to temperature of 1450°C (2642°F) in Fukuda) to have the extremely small viscosity is poured into the mold using the centrifugal force. This differs from the method recited in the amended claim 1 which relates to pouring of the second porcelain into the void provided in the casting mold under pressure. In other words, Fukuda discloses the method of castable ceramic. Accordingly, even if Fukuda is combined with above Janjic and Sozio, such combination shows no teaching, suggestion or motivation to reach the present invention.

In Sekino (USP No. 6,740,267), since a casting creates a ceramic core E (refer to Fig.1), only one porcelain is poured into the mold. Originally, Sekino does not disclose or suggest any idea to pour the second porcelains, when the first porcelain already fixed exists in the mold. Naturally, it does not disclose or suggest the technical concept to make the viscosities different between the first porcelain and the

second porcelain, that is, to use the first porcelain of which viscosity ranges from 10^2 to 10^6 poise at the casing temperature, and the second porcelain of which viscosity ranges from 10^2 to 10^9 poise at the casing temperature. Accordingly, there is shown no teaching, suggestion or motivation in Sekino to reach the present invention.

Brodkin discloses some kinds of porcelain compositions (refer to Table 3 and the like). As the examiner stated in the Office Action, the first porcelain that is the opaque porcelain recited in claims 5 or 9 of this application, and a part of the Opaque Porcelain shown in Table 3 of Brodkin are common in the composition. However, the second porcelain recited in claim 5 or 9 of this application having MgO as an essential component, differs from the part of the Opaque Porcelain shown in Table 3 of Brodkin. Further, the second porcelain recited in claim 5 or 9 of this application corresponds not to the Opaque Porcelain but to the cast porcelain. Then, it should be compared with a Body and Incisal Porcelain shown in Table 3 of Brodkin, and the cast porcelain and Body and Incisal Porcelain are different from each other in those compositions. Thus, Brodkin, which does not disclose the claimed porcelains, does not provide any teaching, suggestion or motivation to reach the present invention.

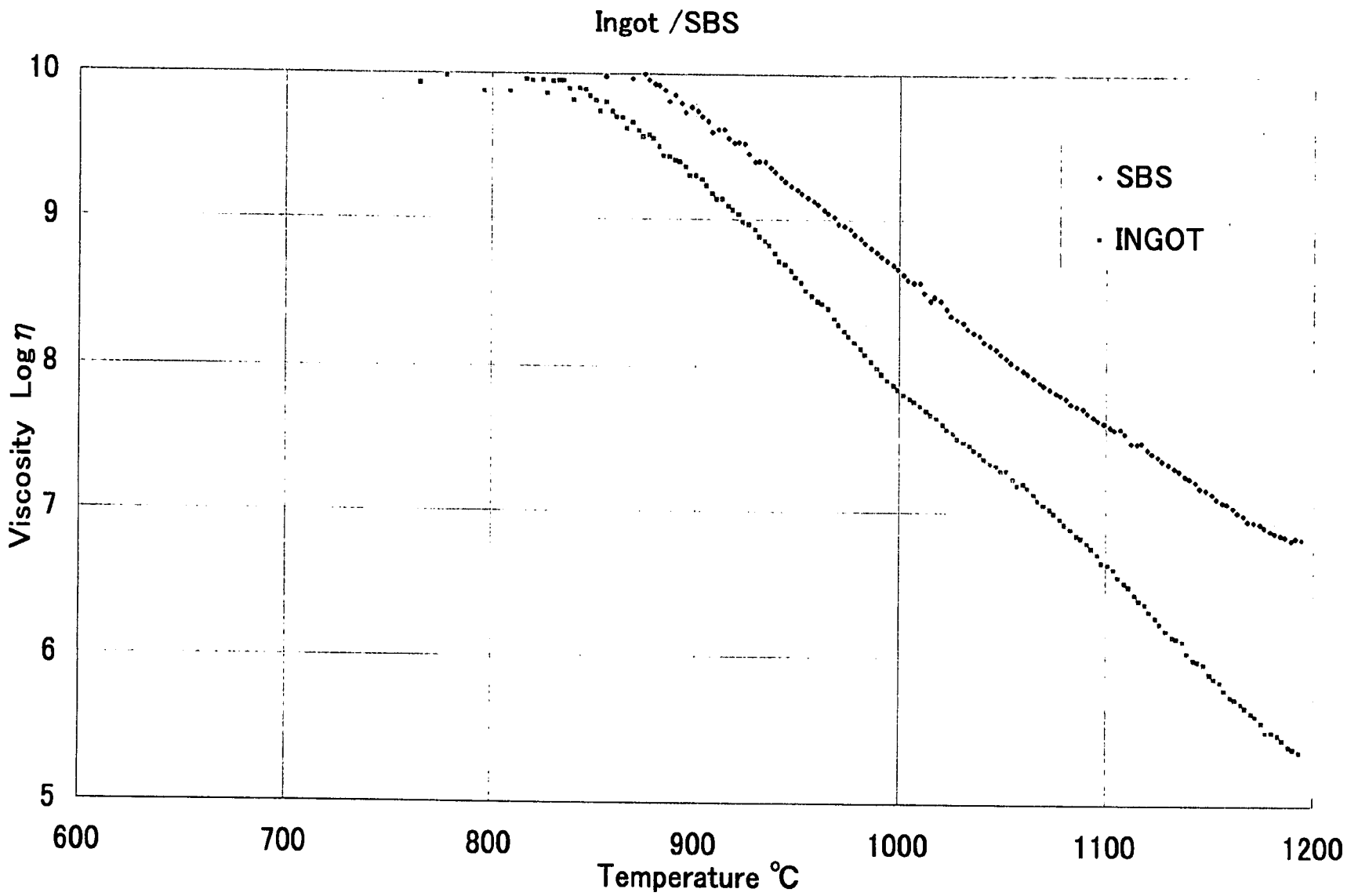
4. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and brief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United State Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: 09/03/2010

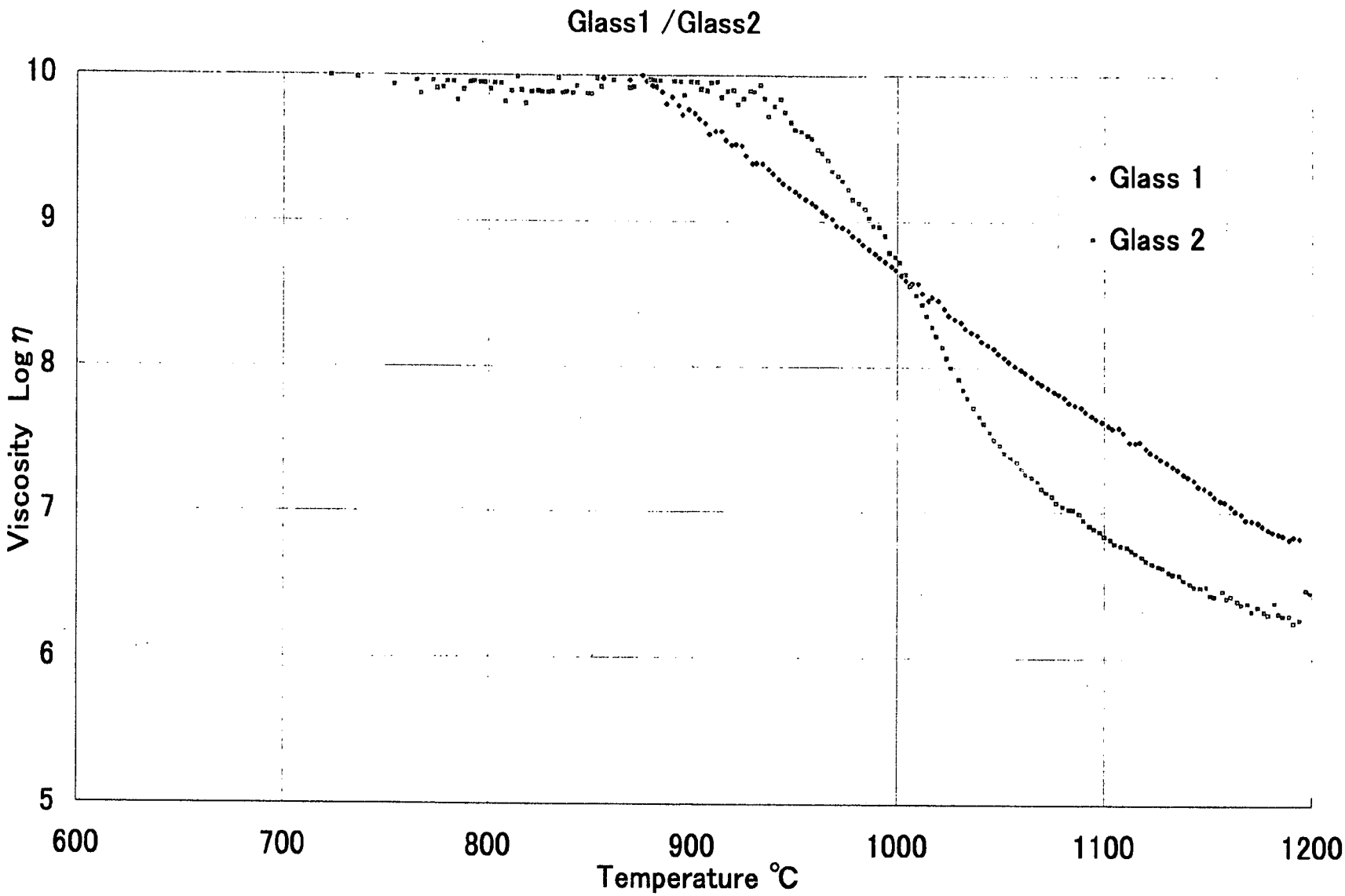
Signature: Sumihito Sago

Sumihito SAGO

MATERIAL I


Ingot /SBS
10
9
8
7
6
5
Viscosity Log η
600
700
800
900
1000
1100
1200
Temperature ℃
SBS
INGOT

MATERIAL II


Glass1 /Glass2
10
9
8
7
6
5
Viscosity Log η
600
700
800
900
1000
1100
1200
Temperature ℃
Glass 1
Glass 2

MATERIAL III

	Glass1(SBS)	Glass2	ingot
SiO2	68.0	39.8	65.6
Al2O3	15.9	7.8	16.1
Fe2O3	0.0		
TiO2		0.9	
Li2O	0.1	0.0	0.1
Na2O	5.0	7.4	4.5
K2O	10.0	7.8	9.8
MgO	0.0	0.1	0.1
CaO	0.3	1.3	0.7
BaO		1.5	
Sb2O3	0.2	0.4	1.0
CeO2		0.4	0.8
ZrO2	0.3	23.1	0.5
B2O3			0.8
F2		0.4	
SnO2		9.1	
	100.0	100.0	100.0

MATERIAL IV

Noritake

CERABIEN

PRESS

TECHNICAL INSTRUCTIONS

Noritake

CZR PRESS

Please access Noritake Web-site for update.

http://www.noritake.co.jp/dental

CZR PRESS is an innovative breakthrough in ceramic nano-technology which consists of the marriage of two time-proven technologies, oxide ceramics and pressable ceramics. This synergy combines the strength, fracture toughness and cementability of pure zirconium oxide copings with the marginal integrity, versatility and beauty of pressable ceramics. Add opalescence and fluorescence to the ingot and the result ··· simply imPRESSive !

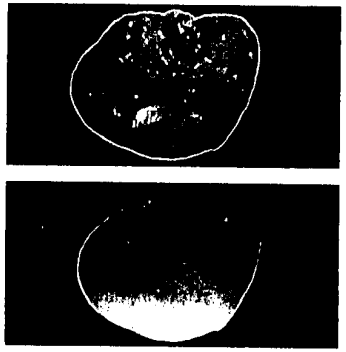
Features

- CZR PRESS may be used with any manufacturer's pure Zirconia framework.
- Unlike traditional metal frameworks, Zirconia frameworks used in CZR PRESS facilitate light transmission into the root and papillae area, thus creating a natural, vital-looking smile.
- CZR PRESS offers 20 shades of fluorescent ingots, each in 2 translucencies;
  H-Ingot — for use when utilizing the "Staining Method" & "LF Layering Method"
  L-Ingot — for use when utilizing the "Layering Method" & "LF Layering Method"
- CZR PRESS feature a "never before seen" opalescent quality which exhibits an exceptional vitality and luster similar to nature.
- CZR PRESS may be used for single unit all-ceramic restorations without frameworks.
- Noritake CZR layering porcelain perfectly compliments CZR PRESS L-Ingot to provide unsurpassed esthetic results.
- Noritake CZR PRESS LF porcelain can be used for single unit restorations without frameworks after pressing.
- CZR PRESS may be used pressed in any conventional press furnace.

Physical Properties

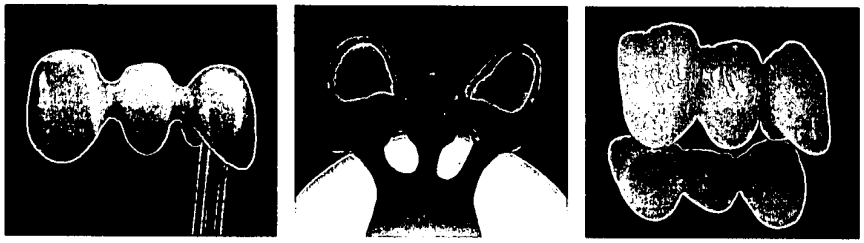
Ceramic Ingots

Flexural Strength (MPa)	92.7
Coefficient of Thermal Expansion (50-500℃ $10^{-6}K^{-1}$)	10.1
Transformation Temperature (℃)	615



Beautiful Opalescent of CZR PRESS Ingot.
(Photo by Mr. Brian Lindke)

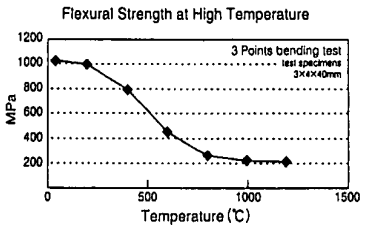
Working Procedures



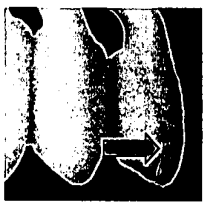
CZR PRESS with the zirconia framework

1. Zirconia Materials used for CZR PRESS

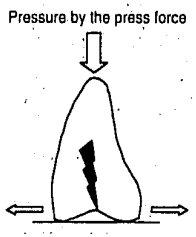
Dental zirconia materials available on the market as of July, 2004 is of the type"3YTZP". This is made by a minute amount of Yttoria (Y_2O_3) being dispersed and solid-soluted in Zirconia (ZrO_2). CZR PRESS has been manufactured to match this type of Zirconia. Although it is a high-strength ceramic material, this strength is at a room temperature and it is greatly lowered at around 1,000℃, which is the temperature whereby CZR PRESS is pressed. The relationship between the flexural strength and temperature is shown in the graph. In zirconia, the strength will return to the original high strength when it is cooled to the room temperature again. In the pressable technique, ceramic ingots are pressed at a high temperature on a zirconia framework. If the framework design is not proper, the zirconia framework may crack when the ceramic ingots are pressed at a high temperature.



Graph.1



Crack that is made during pressing



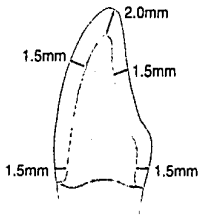
Due to the characteristic of zirconia, lower flexural strength at a high temperature zone is unavoidable. However, in the press technique, pressure is required at a high temperature zone. In order to avoid troubles such as cracks, the frame needs to be designed properly as shown below.

2. Preparation Guidelines and Frame Design:

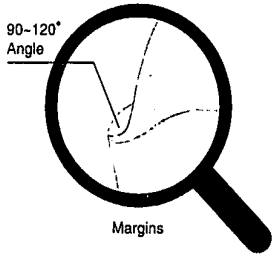
To ensure a strong and esthetic restoration, the following preparation guidelines should be observed:

In this technique, the basic preparation is to allow the pressed ceramic to cover a 360 degrees shoulder with rounded edge or chamfer. Please also note that the thickness of the zirconia framework is **at least 0.4 mm**. As to the thickness of the connectors of the zirconia bridge, please follow the manufacturer's instruction.

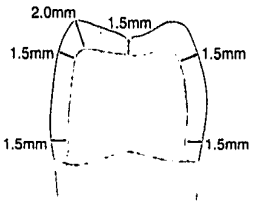
Preparation



Anterior Tooth



Margins



Posterior Tooth

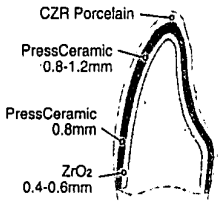
Framework Design

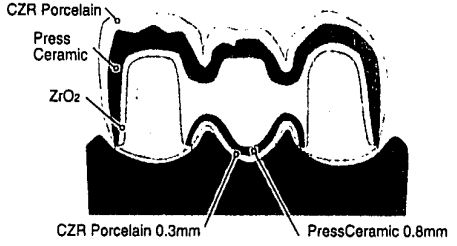
❶Single Crowns:

Maintain a **minimum 0.8mm** thickness of pressed ceramic in all areas.

❷Bridge Restorations:

Maintain a minimum 0.8mm thickness of pressed ceramic on abutments,embrasures, pontic tissue area and at the papillae.

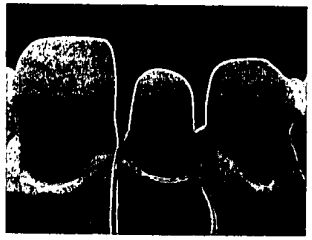




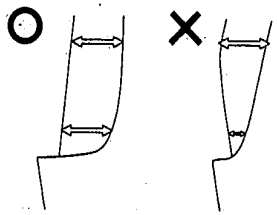
Note This technique is not suited to a severely discolored tooth.

3. Morphological Correction of the Zirconia Framework

If some parts of the zirconia framework are too thick, carefully reduce them using a diamond bur and water. However, the zirconia framework should measure a minimum of 0.4mm thickness in all area to obtain a successful CZR pressing. Additionally, weigh the zirconia framework and record this weight, so that the information may be utilized later as a reference to determine the required number of ingots for pressing.



Coping design at the margin



Correct flame margin　Wrong frame margin

Note ①Secure more than 0.4mm thickness in all parts of the zirconia framework. If the thickness is less than 0.4mm in any parts, there is a greater chance of cracks that will grow longer and wider.

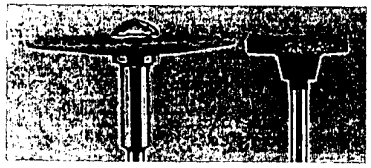
②Secure at least more than 0.4mm thickness evenly with a rounded shoulder in frame margin area. (Refer to the illustration) Knife-edge design toward the margin end is not acceptable as the thickness will gradually be less than 0.4mm.

③The frame margin line should be finished very smoothly. Do not give the margin line serration-finish.

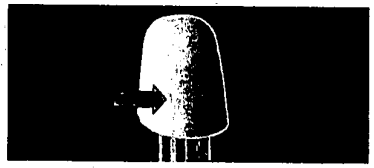
Correct smoothed margin line

Wrong serrated margin line

④Carefully grind the zirconia framework to use grinding burs/discs with minute diamond particles. Noritake Meister Points SD61 and SC51 are ideal. Grinding by tools with rough particles will produce sharp scratches on the surface of the zirconia framework and eventually cause cracks to the framework.Excessive pressure during grinding may also cause cracks due to heat generation. Cooling with water is necessary to avoid heat generation during grinding.



Meister Points SD61 and SC51



Crack that is made during grinding

4. Checking of cracks in zirconia framework

Be sure to check if there are any cracks in the zirconia framework after grinding.
Apply Noritake Crack Finder all over the inside and the outside of a zirconia framework, and after one minute, wipe off the extra liquid on the surface. If there are cracks, the liquid penetrates into the cracks, making it easy to find them.

Note **Never use the cracked zirconia framework**

From the characteristic of zirconia, even a very minute crack in the zirconia framework may be a cause for more cracks that grow bigger and wider after pressing. And then, the framework strength will be greatly lowered. Naturally, it does not have the strength that can be fit in the mouth. If even a crack can be found, never use the cracked framework.

5. Alumina Sandblasting of Zirconia Framework Surface

Create a matt-finish surface by sandblasting with 50 μm alumina at 44psi (=0.3MPa).

6. Cleaning of the Zirconia Framework

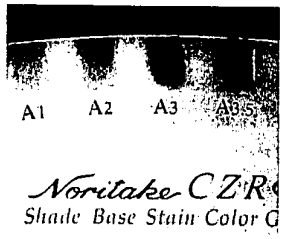
Clean the framework in an ultrasonic unit for 5 minutes in an acetone solution to remove residual zirconia dust and other debris.

7. First Application and Baking of Shade Base Stain

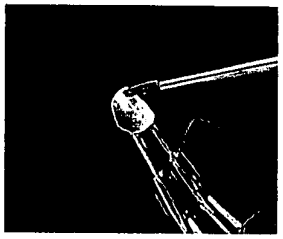
■**The differences between CZR Shade Base Porcelain and CZR PRESS Shade Base Stain**

	CZR Shade Base Porcelain	CZR PRESS Shade Base Stain
Baking temperature	1st. 930°C (1,706°F) 2nd. 930°C (1,706°F)	1st. 1090°C (1,994°F) 2nd. 1080°C (1,976°F)
Grain size	25μm	4μm
Build-up thickness	1st. 0.2mm 2nd. 0.2mm	1st. 0.15mm 2nd. 0.15mm
Combination with CZR Porcelain	Good	Good
Combination with CZR PRESS	Not acceptable	Good

Mix the shade base stain with IS liquid



Shade Base Stain Color Guide



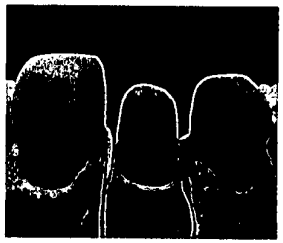
Application of the Shade Base Stain

Mix the shade base stain with **IS liquid**. The consistency of the mixture should be like "Maple Syrup", so that the mixture does not slip down from the framework or puddle at the margins. Apply the mixture evenly and thinly, covering the zirconia framework with 0.15mm thickness, which is slightly thicker than for conventional external stain. Shade Base Stain is a necessary step to produce the basic foundation color. For the first baking of Shade Base Stain, please refer to Baking Schedule, Page 23.

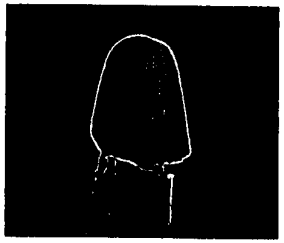
Note IS liquid should never be mixed with water. If mixed, the color will be not clear and the applied mixture will detach from the zirconia framework during drying process.
The application brush should be cleaned with IS liquid only. Never use water for cleaning.

8. Second Application and Baking of Shade Base Stain

Apply the shade base stain mixture again in a thickness of about 0.15 mm. To produce an even color saturation, be sure to perform the second application and baking. For the second baking, refer to the attached 2nd Baking Schedule, Page 23. Also refer to the attached Shade Base Stain Color Guide for the color shades. If applied too thinly, the shade will be low in chroma. If applied too thickly, the shade will be high in chroma.



After baking of the Shade Base Stain



Thin Application of Shade Base Stain

Thick Application of Shade Base Stain

9. Wax-up

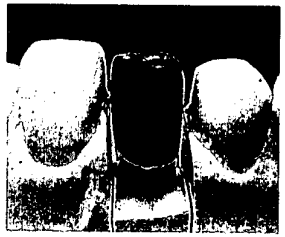
❶Layering Method

Wax-up of the abutment should be done so that there is no space between the framework and wax in all margin-shoulder areas of the abutment. Then wax-up to the dentin shape with 90% size of the completed restoration. Mamelon structure is not needed at this wax-up since it is formed later by cutting after pressing ingots. Be sure to secure the sufficient thickness for the pressed ceramic. Please refer to the pictures on Page 4.

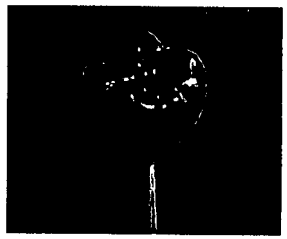
❷Stain Method

Wax-up so that there is no space between the framework and wax in all margin-shoulder areas of the abutment. Then wax-up to the shape of the final restoration.

Note Do not make sharp angles or deep under cuts. After wax-up, check if there is any wax left inside the framework and if there is, carefully wipe off the wax. Also, confirm that there is no space between the framework and wax. If there is, place the waxed-up framework in the correct position on the model and fill the space with wax.



Wax-up for "Layering Method"



Wax-up for "Staining Method"

Wax thickness at the shoulder

10. Spruing, Attaching to the Pedestal Base and Ring Preparation

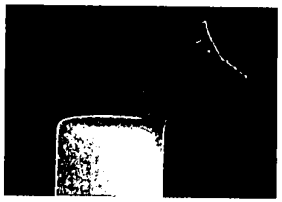
Use 8 gauge (3.3mm diameter) sprues of 2-3 mm in length. Attach sprues to wax patterns and position sprues on pedestal base to facilitate a smooth flow of the press ceramic to all areas of the patterns. If the wax pattern is thin in some areas, more than one sprue may be used.

❶Single crowns:

For larger posterior teeth, position one sprue on each marginal ridge, closer to the proximal walls so that pressed ceramic may flow smoothly. Spruing this way preserves delicate wax contours and little morphological correction is needed. (See Ⓐ, Page 9).

❷Bridges:

Place one sprue each on each abutment and each pontic. Make the sprue length as short as possible; approximately 2-3 mm in length (See Ⓑ, Page 9).



After attaching the sprue

Ⓐ

Ⓑ

After attaching sprues, weigh the waxed restoration and then deduct previously recorded weight of the zirconia framework—this is the net wax weight.

Position the wax patterns at the same height in the ring and maintain a minimum distance of 5mm between wax patterns. The distance between the wax pattern and the ring inner wall must be at least 8mm. Use Noritake Ring Former (pedestal base), Ring and Ring Gauge (leveling cap) for the best results. Apply a dry Teflon®-Silicone spray to the inside of the ring, Ring Former (pedestal base) and Ring Gauge (leveling cap) to prevent investment from sticking to the surface.

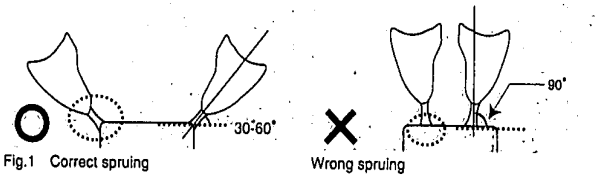


Fig.1 Correct spruing

Wrong spruing

Wrong spruing

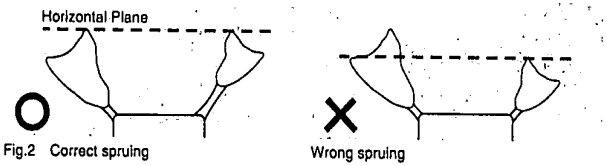


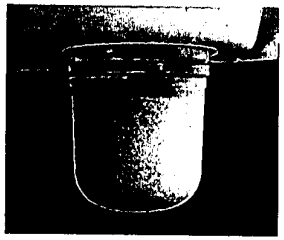
Fig.2 Correct spruing

Wrong spruing

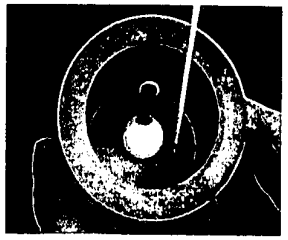
Attach the wax sprue to the edge of the Ring Former (pedestal base) at an angle of 30-60° (Fig.1). When spruing two crowns of different lengths, position the margins of the crowns at the same height (Fig.2).

11. Investing

Mix 100g of Noritake Press Investment powder with 24ml of the special liquid in the mixing bowl or 200g of powder and 48ml of special liquid in the mixing bowl. Make sure the measurement of powder and liquid is accurate. Do not dilute the special liquid with water. Next, mechanically mix the investment for 1 minute under vacuum and then carefully fill the wax pattern (s) and ring without producing any bubbles. After investing, the ring must bench set for a minimum of a half hour. When transporting the ring, hold from the pedestal base, not the sides of the ring.



Mix with Vacuum Mixer



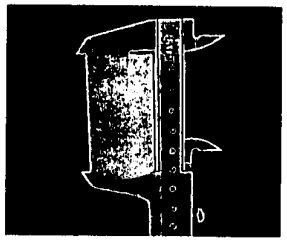
Investing

Bench set 1/2 hour

12. Preparation before Burn-out

After bench setting for half an hour or more at room temperature, remove the ring from the Ring Former and Ring Gauge. Remove the investment button created by the leveling cap with a dry knife. The ring top surface and the side, and the bottom surface and the side should be kept at 90 degrees angle respectively. When a paper ring is used for investing, a vertical seam line is produced where the paper overlaps itself. This must be smoothed with a knife.

Remove the button of investment created by leveling cap

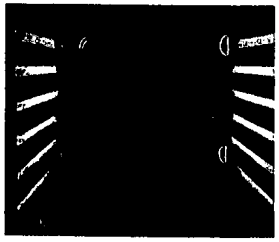


Carefully level the ring so that the top and bottom are perpendicular to the sides of the ring.

13. Burn-out of Investment Ring

Preheat the burn-out furnace to 850℃(1562°F). Place the investment ring in the center of the furnace. Preheating of the ceramic ingot and the plunger is not required.

Do not burn-out press rings with other rings (e.g. soldering models, casting ring, etc)



Burn-out

14. Selection of Ceramic Ingots

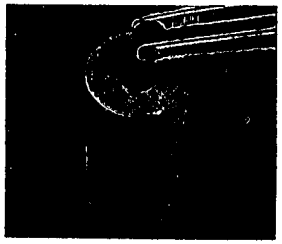
Select ingots dependent upon the method. For the Layering method, select L-Ingot with low transparency and for the Stain method, select H-Ingot with higher transparency of the specified shade.

15. Inserting Ceramic Ingot and Plunger.

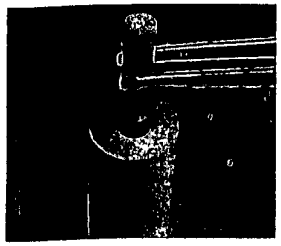
■Relation of Wax Weight and Number of Ingot

Wax Weight	Number of 2g ingots
0.6g or less	1
0.7g up to 1.4g	2

After heating the investment ring at 850℃(1562°F). for an hour, insert the Ceramic ingot of the desired shade and the plunger into the canal of the investment ring. Be sure to use clean tweezers, used exclusively for picking up ingots. Use one ingot for up to two crowns and two ingots for three or more crowns; however, if the wax pattern(s) weight is 0.6 g or less, use one ingot, and if the weight is between 0.7 g and 1.4 g, use two ingots. Pay special attention during this procedure so that no foreign debris attaches itself to the ingots or to the plunger. Note That the plunger is to be inserted vertically into the pressing canal.



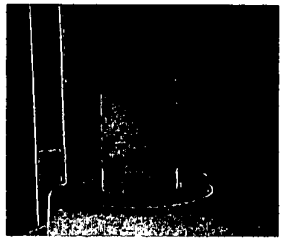
Insertion of the Ingots



Insertion of the Noritake Alumina Oxide Plunger

16. Pressing in the Press Furnace

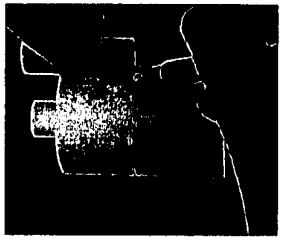
Insert the ceramic ingots and press plunger into the ring, then center the ring on the pressing platform. The pressing schedule may differ depending upon the press furnace manufacturer. Adjust the schedule so that pressing will stop once the ceramic is fully pressed into the cavity. Excessive press time may cause various problems including: split rings, porosity, value shift and brittle or fractured restorations. Follow the pressing schedule according to the pages 24-26. After pressing, immediately remove the investment ring from the furnace and leave it to cool at room temperature until the ring is cool enough to be held.



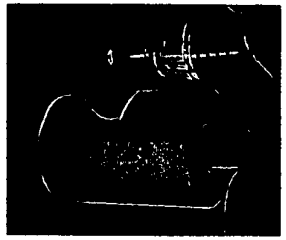
Pressing cycle completed

17. Removal of Noritake Plunger

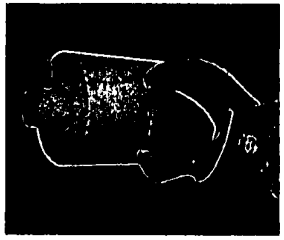
Mark the top position of the plunger, and cut the investment ring with a separating disk. Separate the ring with a plaster nipper. Be careful not to damage the plunger. Using alumina sands, carefully remove the ceramic attached to the plunger.



Marking the top position of the plunger



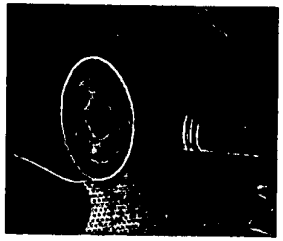
Section with a separating disk



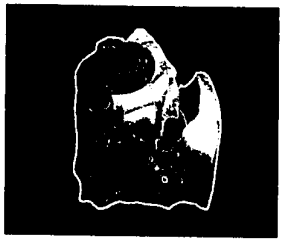
Final removal with a plaster nipper

18. Divesting

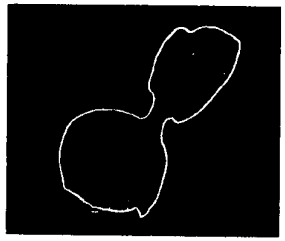
Carefully divest the ring to avoid breaking the pressed ceramic. First, remove the bulk of the investment material (without exposing the pressed ceramic patterns) using 50 μm alumina sands at a pressure of 58-87psi (0.4MPa-0.6MPa). Once the pressed ceramic is exposed, lower the sandblasting pressure to less than 29psi (0.2MPa) and continue alumina sandblasting carefully so as not to chip the thin areas such as the margins or incisal edge. Glass beads are recommended for the thin areas such as the margin and the incisal edge. When divesting patterns, the direction of sandblasting spray should be parallel to the long axis of each crown.



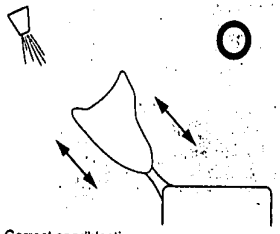
Roughly remove the investment



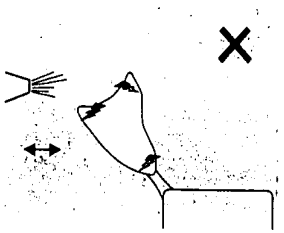
Exposing the pressed ceramic



After completion



Correct sandblasting

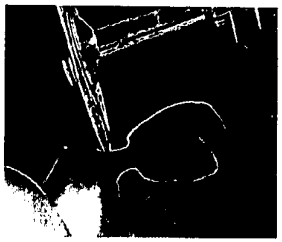


Wrong sandblasting

When divesting the pressed ceramic, blast from the direction indicated in the schematic at the left.

19. Cutting off the Sprue

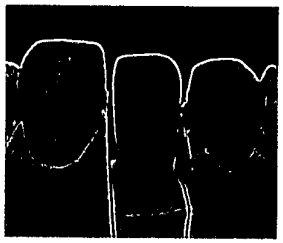
Using a diamond disk for sprue separation, first score a line around the sprue, 2mm from the crown at a low speed, then carefully section through the sprue. In this way, even if the cracks are created within the sprue, they will not spread into the crown. Next, using a diamond point at a low speed, reduce the remaining sprue button on the crown. During this process, do not generate excessive heat or vibration as it may propagate cracks.Noritake Meister Points are recommended for sprue reduction and morphological correction of the porcelain.



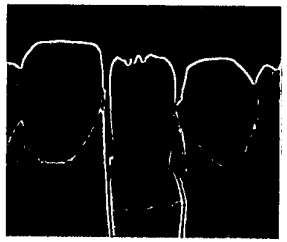
Sprue separation

20. Morphological Correction of Pressed Ceramic

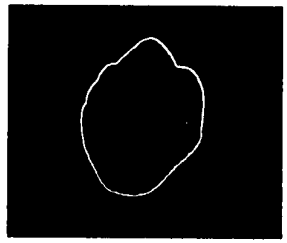
Place the pressed restoration on the model and check the fit at the margin under magnification. The cut-back process depends on which technique is chosen: For the "Layering Method", create the mamelon structure with Meister Points. Special care should be taken to maintain a minimum thickness no less than 0.8mm. For the "Staining Method", refine the delicate surface morphology & texture. After the contours have been finalized, prepare the surface of the pressed ceramic by sandblasting with 50 μm alumina at a maximum 29psi (0.2MPa).



"Layering Method"
Pressed ceramic prior to cut-back



"Layering Method"
cut-back to create mamelon structure



"Staining Method"
after morphological correction

21. Cleaning

Clean the pressed ceramic for 5 minutes in an acetone solution using an ultrasonic cleaner.

Layering Method

L1. Build-up and Baking of CZR Porcelain

Build-up CZR enamel and translucent over the pressed ceramic. The pressed ceramic will not "self-glaze" at the glaze temperature of CZR Porcelain, so be certain to cover the entire surface of the pressed ceramic with CZR Porcelain. The baking schedule for layering porcelain is the same as for CZR Porcelain. See CZR technical instructions at P13. If required, apply CZR Internal Stain on the pressed ceramic and bake it before building-up enamel, translucent and luster porcelains.

Note Refer to the CZR technical instructions for the build-up techniques and baking schedule for CZR Porcelain .

L2. Morphological Correction

Perform morphological correction as usual. If required, perform second build-up of CZR Porcelain and bake according to baking schedule.

L3. Stain & Glaze

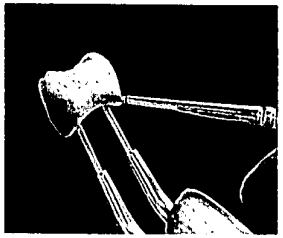
If necessary, apply the CZR ES (External Stain) to characterize restoration. Perform glaze bake according to the "Self Glaze" or "Glaze Powder & External Stain Bake" schedule in the CZR Baking Schedule.

Completed crown after glaze bake

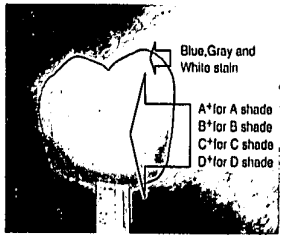
Stain Method

S1. Application of Stain and Baking

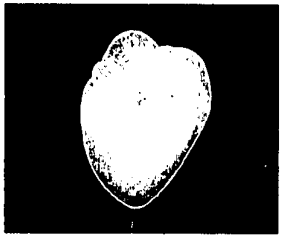
Mix CZR ES (External Stain) with ES liquid. Mix ES to the same consistency as with ordinary stains. If too much liquid is used, the stain will move after the application. For A shades, first apply A+ ES stain over the area except the incisal edge or occlusal surface of the entire crown. Similarly, apply B+ ES stain for B shade, C+ for C shade, D+ for D shade. For incisal edge or occlusal surface, apply ES stains such as Blue, Gray and White. Considering aesthetics, apply the mixture over the surface of the restoration for the final shades. Then, bake according to the baking schedule on Page 23. Perform characterization, if necessary, and bake again by the same baking schedule. If characterization is over lapped by more than two stains, separate baking is recommended.



Application of ES



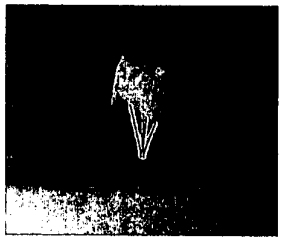
Example of ES



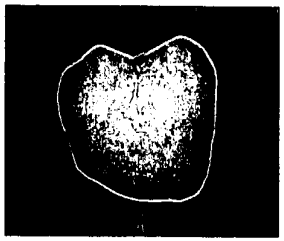
Before baking

S2. First Glazing

Using **IS Liquid**, mix with CZR Press Glaze Powder to create a "cold honey-like" glaze paste. Do not wet the surface of the restoration with IS liquid prior to glaze application, otherwise inconsistent coverage may result. Apply liberally and evenly over the restoration in a 0.2mm thickness. Inspect restoration to verify complete coverage. Perform the first glaze baking according to the baking schedule on, Page 23.



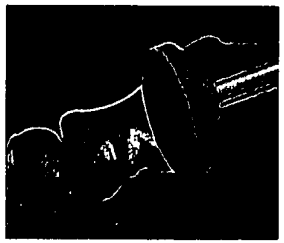
After dry out



After first glazing

S3. Adjusting the Contact Area and Morphological Correction

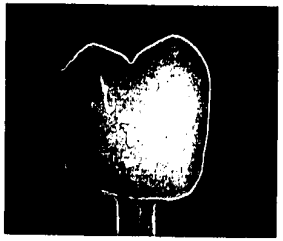
Using a rubber wheel such as the Meister Point SF-41, adjust the contact area of glaze layer. If necessary, make morphological correction. Finally, clean the restoration in an ultrasonic cleaner as in Step 21, Page 14.



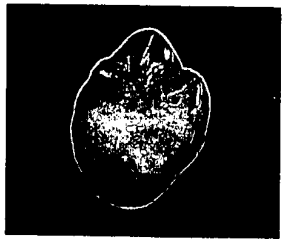
Adjusting the contact area

S4. Second Glazing and Completion

Dilute the glaze mixture used in the first glaze application to a little runnier consistency. Apply the glaze over the entire surface of the restoration and bake again according to the baking schedule on Page 23 to complete the staining method.



Completed crown after second glaze baking



Completed crown using "Staining Method"

LF Layering Method

Noritake CZR PRESS LF is low fusing porcelain to be built up to make an enamel layer after pressing CZR PRESS ingot. By using this porcelain with pressed ceramic without a zirconia framework, you can make a single crown, a porcelain laminate veneer, an inlay and an onlay.

F1. Build-up of CZR PRESS LF Porcelain

Mix CZR PRESS LF Enamel Porcelain with specially prepared Noritake CZR PRESS LF Liquid and build-up to 1/3 of the crown from the incisal edge. Similarly, mix CZR PRESS LF Translucent or Luster Porcelain with Noritake CZR PRESS LF liquid and build-up the entire surface of the crown. After that, check if the extra porcelain is attached to the inside of the crown. Wipe it off with a dry brush. Then, bake it.

Note This is low fusing porcelain. In case any fiber such as tissue paper remains after baking, it should be removed .

F2. Morphological Correction

Perform morphological correction using Meister point, Meister cone and Pearl Surface. Then, Clean the restoration for 5 minutes in acetone solution with an ultrasonic cleaner.

F3. Glaze Baking and Completion

Perform glaze baking according to Baking Schedule on Page 23.

Precautions for Handling

Press Ceramic and Stain

1. The only method for fabricating a single anterior crown and inlay or onlay without a zirconia framework is by the "Staining Technique" or "LF Layering Technique". CZR PRESS is not indicated for bridges without a zirconia framework.
2. Use only CZR ES (External Stain) and CZR Press Glaze Powder for staining technique.
3. If a CZR PRESS restoration is made without a zirconia framework and then layered with normal CZR Porcelain, the crown will deform. Please use CZR PRESS LF in this case.
4. CZR Porcelain and CZR PRESS LF is precisely matched to CZR PRESS. Do not use other manufacturers' zirconia porcelains, metal porcelains and alumina porcelains.
5. CZR PRESS cannot be used on alumina frameworks and metal frameworks.
6. Do not use other manufacturers' shade base stain.
7. Due to lower baking temperature, CZR Shade Base Porcelain must not be used for CZR PRESS. CZR PRESS Shade Base Stain must be used for CZR PRESS restorations.
8. To prevent contamination from foreign materials in the pressed ceramic, always use new wax which does not contain impurities and burns-out without leaving ash and other residues. Be sure that the framework surface is clean before wax-up.
9. Ceramic ingots cannot be re-used. Re-using ingots will cause certain restoration failure.
10. Never use hydrofluoric acid when it becomes necessary to remove the pressed ceramic from the zirconia framework. The acid will melt the zirconia framework and its strength will be reduced.
11. If the pressed ceramic needs to be removed after pressing over a zirconia framework, re-use of the zirconia framework should be limited to two times.
12. Secure more than 0.4mm thickness in all parts of the zirconia framework

    If the thickness is less than 0.4mm in any parts, there is a greater chance of cracks that will grow longer and wider.

    Secure at least more than 0.4mm thickness evenly with a rounded shoulder in frame margin area. (Refer to the illustration) Knife-edge design toward the margin end is not acceptable as the thickness will gradually be less than 0.4mm.

    The frame margin line should be finished very smoothly. Do not give the margin line serration-finish.
13. Carefully grind the zirconia framework to use grinding burs/discs with minute diamond particles. Noritake Meister Points SD61 and SC51 are ideal. Grinding by tools with rough particles will produce sharp scratches on the surface of the zirconia framework and eventually cause cracks to the framework. Excessive pressure during grinding may also cause cracks due to heat generation. Cooling with water is necessary to avoid heat generation during grinding.

14. From the characteristic of zirconia, even a very minute crack in the zirconia framework may be a cause for more cracks that grow bigger and wider after pressing. And then, the framework strength will be greatly lowered. Naturally, it does not have the strength that can be fit in the mouth. If even a crack can be found, never use the cracked framework.
15. Improper furnace parameters for the pressing cycle may lead to the problems such as an incomplete pressing, a split investment ring, movement and absorption of the shade base stain into the pressed ceramic, porosity, brittleness and value or shade changes. Every manufacturer's press furnace is slightly different; therefore, observe the most appropriate heat-pressing schedule with your press furnace. If excessive pressing time or pressure is maintained too long even after the ceramic is pressed into the cavity, the zirconia framework may crack.
16. On occasion, when tooth reduction is inadequate, less than ideal space is available for pressable thickness over the zirconia framework; consequently, the space created for pressable material is constricted and this in turn, creates resistance against the flow of ingot material. Due to this circumstance, the Shade Base Stain may be carried away into the flow of pressed ceramic. Special care should be taken when waxing to provide adequate space for the subsequent flow of ingot material.
17. The best thickness at the margin area of the CZR PRESS ceramic, not including the thickness of the zirconia framework, is less than 1.0 mm. If it is thicker than 1.0mm, there may be deformation at the margin area after baking of the CZR Porcelain.
18. To prevent flash on the pressings, be sure to observe the above mentioned instructions during spruing and investing.
19. Noritake Press Investment has been scientifically formulated especially for the CZR PRESS technique. Never use other manufacturers' investments.
20. Noritake Plungers must be used for CZR PRESS technique. Never use other manufacturer's plungers.
21. Be sure to use dual-cured, not light cured adhesive resin cement for a crown or inlay without a zirconia framework. This adhesive resin cement is also recommended for a crown with a zirconia framework.

■Resin Cement Example

Product Name	Manufacturer
Panavia F2.0	Kuraray
Panavia 21	Kuraray
Relyx Unicem	3M

Investment

■Spruing

1. The distance from the top of the wax pattern to the top of the ring should be at least 10mm, and the distance from the wax pattern to the inside wall of the ring should be at least 8mm.
2. Always use the new wax which does not contain impurites. Be sure that the framework surface is clean before wax-up.
3. Always keep the sprue former very clean to avoid mixing any dust particles into pressings.

■Mixing

1. Accurately measure and mix 24ml of liquid (or dilute liquid with water) with 100g of investment powder. Refer to **Noritake PRESS INVESTMENT INSTRUCTIONS**, page 2.
2. The physical properties of phosphate-bonded investment change according to the temperature of the materials and equipment used in investing; therefore, maintain a constant temperature of approximately 23℃ (73°F) for the powder, liquid, water and the mixing bowl.
3. Use only distilled water for dilution of "special liquid", but do not dilute more than specified.
4. Use a separate mixing bowl for mixing phosphate-bonded investment. Never use the same mixing bowl for the gypsum-bonded investment or gypsum stone.
5. Properly dispose of the excess investment material. Always use a plaster trap.

■Baking

1. After investing, leave the ring to bench-set (undisturbed) at room temperature for at least 30 min, then place it into the center of the burn-out furnace at 850℃ (1562°F).
2. If the ring is left more than 12 hours after investing, soak it in water for 3-5 minutes, then place it into a preheated furnace at 850℃ (1562°F).
3. Burn-out of the investment ring needs to be done at sufficient oven temperature in order to prevent insufficient wax elimination and to burn-out the remaining ammonia gases from the investment ring.
4. Do not proceed with the pressing process if cracks appear in the ring after burning-out.

■Divesting

1. Divesting must be carefully carried out to avoid any breaking the pressed ceramic.

■Storage

1. Keep in a dry, cool place.
2. After opening the investment package, reseal the package tightly as the investment easily absorbs moisture. Never store investment in plastic bags or containers.
3. To prevent the special liquid from being frozen, never store liquid at temperatures below 0℃ (32°F). Do not use frozen (and then thawed) liquid.
4. Press Investment may be stored until the expiration date if the package has never been opened. Always use before the expiration date. Once the package has been opened, use the investment immediately.

Products

Type and Shades

CZR PRESS／Shade Base Stain (20 shades) 3g each

SS A_1	SS A_2	SS A_3	SS $A_{3.5}$	SS A_4
SS B_1	SS B_2	SS B_3	—	SS B_4
SS C_1	SS C_2	SS C_3	—	SS C_4
—	SS D_2	SS D_3	—	SS D_4

SS NW_0	SS $NW_{0.5}$
SS $NP_{1.5}$	SS $NP_{2.5}$
—	

CZR PRESS／Shade Base Stain Color Guide

CZR PRESS／Press Ingots 2g Ingots 5g Ingots, 5 Ingots per pkg.

Low Translucency (20 shades)

L A_1	L A_2	L A_3	L $A_{3.5}$	L A_4
L B_1	L B_2	L B_3	—	L B_4
L C_1	L C_2	L C_3	—	L C_4
—	L D_2	L D_3	—	L D_4

L NW_0	L $NW_{0.5}$
L $NP_{1.5}$	L $NP_{2.5}$
—	

High Translucency (20 shades)

H A_1	H A_2	H A_3	H $A_{3.5}$	H A_4
H B_1	H B_2	H B_3	—	H B_4
H C_1	H C_2	H C_3	—	H C_4
—	H D_2	H D_3	—	H D_4

H NW_0	H $NW_{0.5}$
H $NP_{1.5}$	H $NP_{2.5}$
—	

CZR PRESS LF PORCELAIN 10g,50g,200g

LF E_1	LF E_2	LF E_3	—	—	—
LF Tx	LF T_0	LF T_1	LF T_2	LF LT_0	LF LT_1
LF TBlue	LF LT Natural	LF Creamy Enamel	LF Sun Bright	LF Incisal Aureola	LF Creamy White

CZR PRESS／Glaze Powder 10g

CZR PRESS／Crack Finder 20ml×2 per pkg.

CZR PRESS／Ring (Flexible rubber for mold) 100g,200g,300g type

CZR PRESS／Ring Former (with Ring gauge) 100g,200g,300g type

CZR PRESS／Plunger (Alumina Oxide) 3 pieces per pkg.

Dispo Plunger 2G (for 2g ingots) 50 pieces per pkg.

Dispo Plunger 5G (for 5g ingots) 50 pieces per pkg.

Press investment set 100g×30 packs and 800ml liquid

We newly added 5g-ingots, 2 types of disposable plunger and low-fusing porcelains.

Color Combination Table

Color Combination Table

Layering Method

	A_1	A_2	A_3	$A_{3.5}$	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Shade Base Stain	SS A_1	SS A_2	SS A_3	SS $A_{3.5}$	SS A_4	SS B_1	SS B_2	SS B_3	SS B_4	SS C_1	SS C_2	SS C_3	SS C_4
Press Ingot	L A_1	L A_2	L A_3	L $A_{3.5}$	L A_4	L B_1	L B_2	L B_3	L B_4	L C_1	L C_2	L C_3	L C_4
Body	A_1B	A_2B	A_3B	$A_{3.5}B$	A_4B	B_1B	B_2B	B_3B	B_4B	C_1B	C_2B	C_3B	C_4B
Enamel	E_2	E_2	E_3	E_3	E_3	E_1	E_2	E_3	E_3	E_2	E_3	E_3	E_3
Translucent	Luster LT_1／Translucent T_1												

	D_2	D_3	D_4	NW_0	$NW_{0.5}$	$NP_{1.5}$	$NP_{2.5}$
Shade Base Stain	SS D_2	SS D_3	SS D_4	SS NW_0	SS $NW_{0.5}$	SS $NP_{1.5}$	SS $NP_{2.5}$
Press Ingot	L D_2	L D_3	L D_4	L NW_0	L $NW_{0.5}$	L $NP_{1.5}$	L $NP_{2.5}$
Body	D_2B	D_3B	D_4B	NW_0B	$NW_{0.5}B$	$NP_{1.5}B$	$NP_{2.5}B$
Enamel	E_2	E_3	E_3	E_1	E_1	E_2	E_2
Translucent	Luster LT_1／Translucent T_1						

Staining Method

	A_1	A_2	A_3	$A_{3.5}$	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Shade Base Stain	SS A_1	SS A_2	SS A_3	SS $A_{3.5}$	SS A_4	SS B_1	SS B_2	SS B_3	SS B_4	SS C_1	SS C_2	SS C_3	SS C_4
Press Ingot	H A_1	H A_2	H A_3	H $A_{3.5}$	H A_4	H B_1	H B_2	H B_3	H B_4	H C_1	H C_2	H C_3	H C_4
External Stain	A+	A+	A+	A+	A+	B+	B+	B+	B+	C+	C+	C+	C+
Glaze Powder	CZR Press Glaze Powder												

	D_2	D_3	D_4	NW_0	$NW_{0.5}$	$NP_{1.5}$	$NP_{2.5}$
Shade Base Stain	SS D_2	SS D_3	SS D_4	SS NW_0	SS $NW_{0.5}$	SS $NP_{1.5}$	SS $NP_{2.5}$
Press Ingot	H D_2	H D_3	H D_4	H NW_0	H $NW_{0.5}$	H $NP_{1.5}$	H $NP_{2.5}$
External Stain	D+	D+	D+	B+	A+	A+	A+
Glaze Powder	CZR Press Glaze Powder						

LF Layering Method

	A_1	A_2	A_3	$A_{3.5}$	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Shade Base Stain	SS A_1	SS A_2	SS A_3	SS $A_{3.5}$	SS A_4	SS B_1	SS B_2	SS B_3	SS B_4	SS C_1	SS C_2	SS C_3	SS C_4
Press Ingot	A_1	A_2	A_3	$A_{3.5}$	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	C_4
Enamel	LF E_2	LF E_2	LF E_3	LF E_3	LF E_3	LF E_1	LF E_2	LF E_3	LF E_3	LF E_2	LF E_3	LF E_3	LF E_3
Translucent	LF Luster or LF Translucent Colors												

	D_2	D_3	D_4	NW_0	$NW_{0.5}$	$NP_{1.5}$	$NP_{2.5}$
Shade Base Stain	SS D_2	SS D_3	SS D_4	SS NW_0	SS $NW_{0.5}$	SS $NP_{1.5}$	SS $NP_{2.5}$
Press Ingot	D_2	D_3	D_4	NW_0	$NW_{0.5}$	$NP_{1.5}$	$NP_{2.5}$
Enamel	LF E_2	LF E_3	LF E_3	LF E_1	LF E_1	LF E_2	LF E_2
Translucent	LF Luster or LF Translucent Colors						

Baking Schedule

Baking Schedule for Shade Base Stain

	1st bake		2nd bake	
Dry-Out Time	5min.		5min.	
Low Temperature	700℃	1292°F	700℃	1292°F
Start Vacuum	700℃	1292°F	700℃	1292°F
Heat Rate	65℃/min.	117°F/min.	65℃/min.	117°F/min.
Vacuum Level	96kPa※1		96kPa※1	
Release Vacuum	1090℃	1994°F	1080℃	1976°F
High Temperature	1090℃	1994°F	1080℃	1976°F
Hold Time (in the air)	1min.		1min.	
Cool Time	4min.		4min.	

Baking Schedule for ES Stain

Staining method

	ES stain bake	
Dry-Out Time	5min.	
Low Temperature	600℃	1112°F
Start Vacuum	600℃	1112°F
Heat Rate	50℃/min.	90°F/min.
Vacuum Level	87kPa※2	
Release Vacuum	850℃	1562°F
High Temperature	850℃	1562°F
Hold Time (in the air)	—	
Cool Time	4min.	

Baking Schedule for CZR Press Glaze

Staining method

	1st bake and 2nd bake	
Dry-Out Time	5min.	
Low Temperature	600℃	1112°F
Start Vacuum	600℃	1112°F
Heat Rate	65℃/min.	117°F/min.
Vacuum Level	96kPa※1	
Release Vacuum	850℃	1562°F
High Temperature	900℃	1652°F
Hold Time (in the air)	1min.	
Cool Time	4min.	

Note The above program is only a guideline.
Baking Temperature may be varied with the peculiarities of different furnace.
※1 96kPa=72cmHg (29inchesHg)
※2 87kPa=65cmHg (26inchesHg)

Baking Schedule for CZR PRESS LF

	1st bake and 2nd bake		Self Glaze	
Dry-Out Time	7min.		5min.	
Low Temperature	600℃	1112°F	600℃	1112°F
Start Vacuum	600℃	1112°F	—	—
Heat Rate	45℃/min.	81°F/min.	45℃/min.	81°F/min.
Vacuum Level	96kPa※		—	
Release Vacuum	840℃	1544°F	—	—
High Temperature	840℃	1544°F	840℃	1544°F
Hold Time (in the air)	1min.		1min.	
Cool Time	4min.		4min.	

Note The above program is only a guideline.
Baking Temperature may be varied with the peculiarities of different furnace.
※96kPa=72cmHg (29inchesHg)

Pressing Parameters

Recommendation of "Pressing at low pressure" during CZR Pressing

The press furnace pressure for the pressable technique is usually set at 4bar (0.4MPa) to 5 bar (0.5MPa). However, in the case of pressing of CZR PRESS ingots, this pressure is too high and often cause the following problems.

①Cracks of the zirconia frameworks after pressing
②Breaking of the investment ring after pressing

In order to avoid the above problems, we would like to recommend lowering the pressing pressure during CZR PRESS pressing. This is strongly recommended in addition to the notes for the zirconia framework thickness and shape.

Please adjust the pressing schedule referring to the following table. As a general rule, longer pressing time is required during the pressing at low pressure. Adjust the pressure regulator to the pressure specified below.

Press Parameters for the EP500 (Ivoclar)

Pressing in a Small ring 1 Ingot Ring Size=wt.100g

B	t↑	T	H	V1	V2	Pressure	N
700℃	60℃	1045℃	15min.	700℃	1045℃	4.5bar	—
1292°F	108°F	1913°F	15min.	1292°F	1913°F	4.5bar	—

Pressing in a Large ring 1 Ingot/2 Ingots Ring Size=wt.200g

B	t↑	T	H	V1	V2	Pressure	N
700℃	60℃	1065℃	20min.	700℃	1065℃	4.5bar	—
1292°F	108°F	1949°F	20min.	1292°F	1949°F	4.5bar	—

In case of EP500, set the pressure at 4.5 bar.

Press Parameters for the EP600 (Ivoclar)

Pressing in a Small ring 1 Ingot Ring Size=wt.100g

B	t↑	T	H	E
700℃	60℃	1045℃	15min.	300μm/min.
1292°F	108°F	1913°F	15min.	300μm/min.

Pressing in a Large ring 1 Ingot/2 Ingots Ring Size=wt.200g

B	t↑	T	H	E
700℃	60℃	1065℃	20min.	300μm/min.
1292°F	108°F	1949°F	20min.	300μm/min.

In case of EP600, set the stopping speed at 300μm/min. and adjust the press cycle

The above pressing times are recommended only as our guide.
Please find the best pressing times that suit your furnace depending upon the size and number of the patterns.

Press Parameters for the Multimat Touch & Press (Dentsply DeTrey)

■Pressing in a Small ring 1 Ingot Ring Size=wt.100g

Start temp.	Vacuum Level	Heat Rate	Press Temp.	Hold Time	Press Time	Pressure
700℃	50HPa	60℃/min.	1045℃	15min.	4min.	2.7bar
1292°F	50HPa	108°F/min.	1913°F	15min.	4min.	2.7bar

■Pressing in a Large ring 1 Ingot Ring Size= wt.200g

Start temp.	Vacuum Level	Heat Rate	Press Temp.	Hold Time	Press Time	Pressure
700℃	50HPa	60℃/min.	1065℃	20min.	5min.	2.7bar
1292°F	50HPa	108°F/min.	1949°F	20min.	5min.	2.7bar

■Pressing in a large ring 2 Ingots Ring Size=wt.200g

Start temp.	Vacuum Level	Heat Rate	Press Temp.	Hold Time	Press Time	Pressure
700℃	50HPa	60℃/min.	1065℃	20min.	6min.	2.7bar
1292°F	50HPa	108°F/min.	1949°F	20min.	6min.	2.7bar

Press Parameters for the Pro-Press100 (Whip Mix Intra Tech)

■Pressing in a Small ring 1 Ingot Ring Size=wt.100g

Entry temp.	Vacuum Level	Heat Rate	Final Temp.	Hold Time	Press Time(Note)	Cool Time	Pressure
700℃	Full	60℃/min.	1045℃	15min.	4min.	0.2min.	2.7bar
1292°F	Full	108°F/min.	1913°F	15min.	4min.	0.2min.	2.7bar

Note In case Special Function Button has been selected, enter "0min." for Re-Press time.

■Pressing in a Large ring 1 Ingot Ring Size= wt.200g

Entry temp.	Vacuum Level	Heat Rate	Final Temp.	Hold Time	Press Time(Note)	Cool Time	Pressure
700℃	Full	60℃/min.	1065℃	20min.	6min.	0.2min.	2.7bar
1292°F	Full	108°F/min.	1949°F	20min.	6min.	0.2min.	2.7bar

Note In case Special Function Button has been selected, enter "2min." for Re-Press time.

■Pressing in a large ring 2 Ingots Ring Size=wt.200g

Entry temp.	Vacuum Level	Heat Rate	Final Temp.	Hold Time	Press Time(Note)	Cool Time	Pressure
700℃	Full	60℃/min.	1065℃	20min.	8min.	0.2min.	2.7bar
1292°F	Full	108°F/min.	1949°F	20min.	8min.	0.2min.	2.7bar

Note In case Special Function Button has been selected, enter "4min." for Re-Press time.

The above pressing times are recommended only as our guide.
Please find the best pressing times that suit your furnace depending upon the size and number of the patterns.

Press Parameters for the Ceram Press Qex (Dentsply NeyTech)

■Pressing in a Small ring 1 Ingot Ring Size=wt.100g

Start temp.	Heat Rate	Vacuum	Press Temp.	Hold	Press	Pressure
700℃	60℃/min.	ON	1045℃	15min.	8min.	2.7bar
1292°F	108°F/min.	ON	1913°F	15min.	8min.	2.7bar

■Pressing in a Large ring 1 Ingott Ring Size= wt.200g

Start temp.	Heat Rate	Vacuum	Press Temp.	Hold	Press	Pressure
700℃	60℃/min.	ON	1065℃	20min.	11min.	2.7bar
1292°F	108°F/min.	ON	1949°F	20min.	11min.	2.7bar

■Pressing in a large ring 2 Ingotst Ring Size=wt.200g

Start temp.	Heat Rate	Vacuum	Press Temp.	Hold	Press	Pressure
700℃	60℃/min.	ON	1065℃	20min.	14min.	2.7bar
1292°F	108°F/min.	ON	1949°F	20min.	14min.	2.7bar

Press Parameters for the Auto Press Plus (Pentron Lab)

■Pressing in a Small ring 1 Ingot Ring Size= wt.100g

T1	T2	Rate	H1	H2	Vacuum	Pressure
700℃	1045℃	60℃/min.	15min.	6min.	Max Vac.	2.7bar
1292°F	1913°F	108°F/min.	15min.	6min.	Max Vac.	2.7bar

■Pressing in a Large ring 1 Ingott Ring Size=wt.200g

T1	T2	Rate	H1	H2	Vacuum	Pressure
700℃	1065℃	60℃/min.	20min.	7min.	Max Vac.	2.7bar
1292°F	1949°F	108°F/min.	20min.	7min.	Max Vac.	2.7bar

■Pressing in a Large ring 2 Ingots Ring Size=wt.200g

T1	T2	Rate	H1	H2	Vacuum	Pressure
700℃	1065℃	60℃/min.	20min.	8min.	Max Vac.	2.7bar
1292°F	1949°F	108°F/min.	20min.	8min.	Max Vac.	2.7bar

The above pressing times are recommended only as our guide. Please find the best pressing times that suit your furnac depending upon the size and number of the patterns.

Note For the pressing at low pressure, we have tested many times and decided the pressing schedule. But, please note that the pressing at lower pressure less han the recommended pressure by the press furnace manufacturer may be outside the performance guarantee of the manufacturer

Please check the parameters for pressing 5g-ingots on our up-dated web-site at : http://www.noroitake.co.jp/dental

Remarks on Safety

- Work in a well-ventilated room during mixing and firing investment.
- Investment and ceramic material contains Silica. Avoid inhaling the dust. Use a dust collector and an approved dust mask. Over exposures may cause delayed lung injury.
- Avoid exposure to eyes. Wear the goggles for eye protection during cutting or polishing works. In case of contact with eyes, flush eyes with copious amounts of water and consult an eye-doctor.
- Avoid eye contact with all CZR PRESS liquids. In case of contact with eyes, flush eyes with copious amounts of water and consult an eye-doctor.
- Do not touch items heated by the furnace with your bare hand.
- Keep IS Liquid, ES Liquid and Crack Finder away from flames and high temperatures. They are flammable.
- Ceramic Ingot containers are made of glass. Be careful in handling them.
- Some people are sensitive to skin contact. Wear rubber gloves to protect your skin.
- Avoid ingesting. Keep out of the reach of children.
- This material is for dental application only. Do not use for any purpose not specified in the instruction manual.

■SYMBOLS USED IN A LABEL

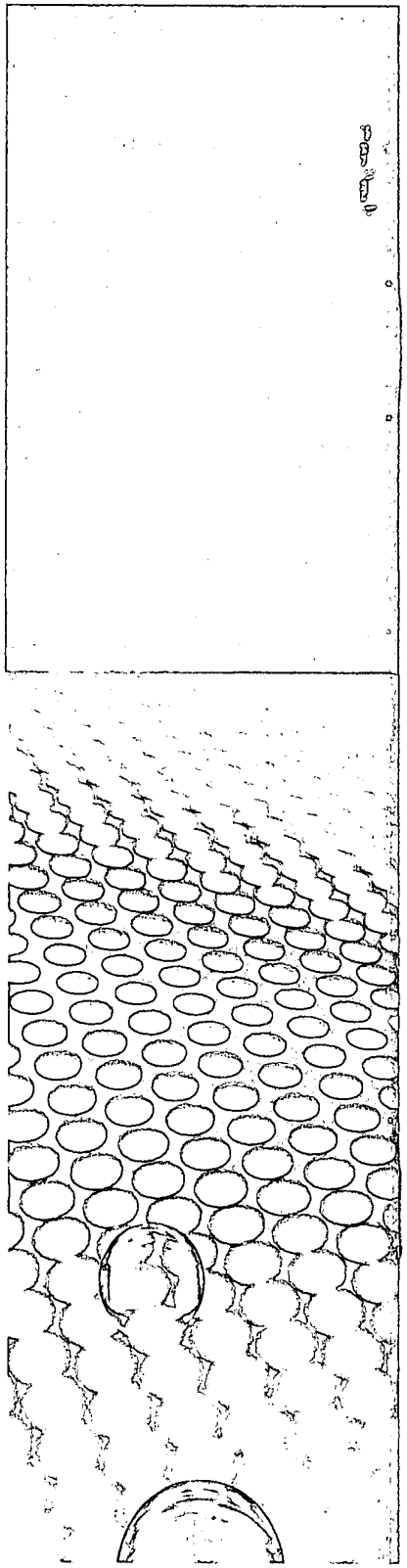
SYMBOL	MEANING
	MANUFACTURER
	USE BY
LOT	BATCH CODE
	CAUTION, CONSULT ACCOMPANYING DOCUMENTS. ATTENTION, SEE INSTRUCTIONS FOR USE.
EC REP	AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY

· Contraindications

If the patient is hypersensitive to Dental Porcelain or any of the other components, this medical product should not be used. Or it should be only used under the strict supervision of the patient's doctor/dentist.

· EU Authorized Representative

Name : EMERGO EUROPE
Address : Molenstraat 15, 2513 BH,
The Hague, The Netherlands



CE 0120

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